

I CLAIM:

1. A door closer comprising:

a closer casing having first and second end portions opposite to each other in a longitudinal direction;

5 a pivot unit including

a pivot axle having a drive end portion that extends into and that is retained rotatably in said first end portion of said closer casing, and a coupling end portion that extends out of said closer casing,

10 a cam member mounted co-rotatably on said drive end portion of said pivot axle, and

a cam follower member disposed in said closer casing and acted upon by said cam member for moving along the longitudinal direction between open and closing positions upon rotation of said pivot axle; and

15 a length-variable damping cylinder disposed in said closer casing and having one end coupled to said cam follower member and an opposite end anchored to said second end portion of said closer casing, said damping cylinder accumulating a restoring force upon movement of said cam follower member from the closing position to the open position, and releasing the restoring force to assist movement of said cam follower member from the open position back to the closing position.

20 2. The door closer as claimed in Claim 1, wherein said damping cylinder includes:

an outer tube confining a tube space and having a closed first end, and a second end opposite to said closed first end and having a closure member mounted therein;

5 a first piston disposed in said outer tube and partitioning said tube space into a pneumatic chamber filled with air and a hydraulic chamber filled with hydraulic fluid, said pneumatic chamber being confined by said closed first end and said first piston, said hydraulic chamber being confined by said first piston
10 and said closure member;

a second piston disposed in said outer tube and partitioning said hydraulic chamber into a first sub-chamber and a second sub-chamber, said second piston having a first face confronting said first piston and
15 a second face confronting said closure member, said first sub-chamber being confined by said first piston and said first face of said second piston, said second sub-chamber being confined by said second face of said second piston and said closure member, said second piston further
20 having a plurality of first fluid passages formed through said first and second faces for establishing fluid communication between said first and second sub-chambers; and

a piston rod unit having a first end portion connected
25 to said second piston, and an opposite second end portion extending through said closure member and disposed outwardly of said outer tube.

3. The door closer as claimed in Claim 2, wherein said first end portion of said piston rod unit is formed with a second fluid passage that establishes fluid communication between said first and second sub-chambers, said damping cylinder further including a check valve mounted on said first end portion of said piston rod unit and operable so as to permit fluid flow from said first sub-chamber to said second sub-chamber through said first fluid passages and so as to block fluid flow from said second sub-chamber to said first sub-chamber through said first fluid passages.

4. The door closer as claimed in Claim 3, wherein said piston rod unit includes an inner tube connected to said second piston and a regulating rod disposed slidably in said inner tube, said second fluid passage including an axial portion in fluid communication with said first sub-chamber, and a radial portion in fluid communication with said second sub-chamber, said regulating rod being slidable in said inner tube so as to regulate amount of fluid flow through said axial and radial portions of said second fluid passage.

5. The door closer as claimed in Claim 4, wherein said check valve includes a valve plate sleeved on said inner tube and disposed adjacent to said second face of said second piston, and a biasing member for biasing said valve plate towards said second face of said second piston.

6. The door closer as claimed in Claim 4, wherein said closed first end of said outer tube is secured to said cam follower member, and said regulating rod includes a regulating end portion for regulating fluid flow through said second fluid passage, and an adjusting end portion anchored to said second end portion of said closer casing.

7. The door closer as claimed in Claim 6, wherein said regulating end portion is a tapered end portion.

8. The door closer as claimed in Claim 6, further comprising an adjusting unit for mounting adjustably said adjusting end portion of said regulating rod in said closer casing.

9. The door closer as claimed in Claim 8, wherein said adjusting unit includes:

a first wedge connected to said adjusting end portion of said regulating rod and having a first bevel surface;

a second wedge having a second bevel surface in sliding contact with said first bevel surface; and

a screw fastener connected to said second wedge and threadedly engaging said closer casing.

10. The door closer as claimed in Claim 9, wherein said adjusting unit further includes a retaining seat mounted in said second end portion of said closer casing and movably confining said first and second wedges therein.

11. The door closer as claimed in Claim 1, wherein said cam member is eccentric with respect to said pivot axle,

said cam follower member including a pair of plates that sandwich said cam member therebetween, and a plurality of connecting studs that interconnect said plates and that are acted upon by said cam member.

- 5 12. The door closer as claimed in Claim 11, wherein said cam member has a periphery formed with a positioning notch that engages one of said connecting studs for positioning releasably said cam follower member at the open position.